# An Assessment of DOD's 2008 Major Acquisition Program Portfolio

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**6th Annual Acquisition Research Symposium**
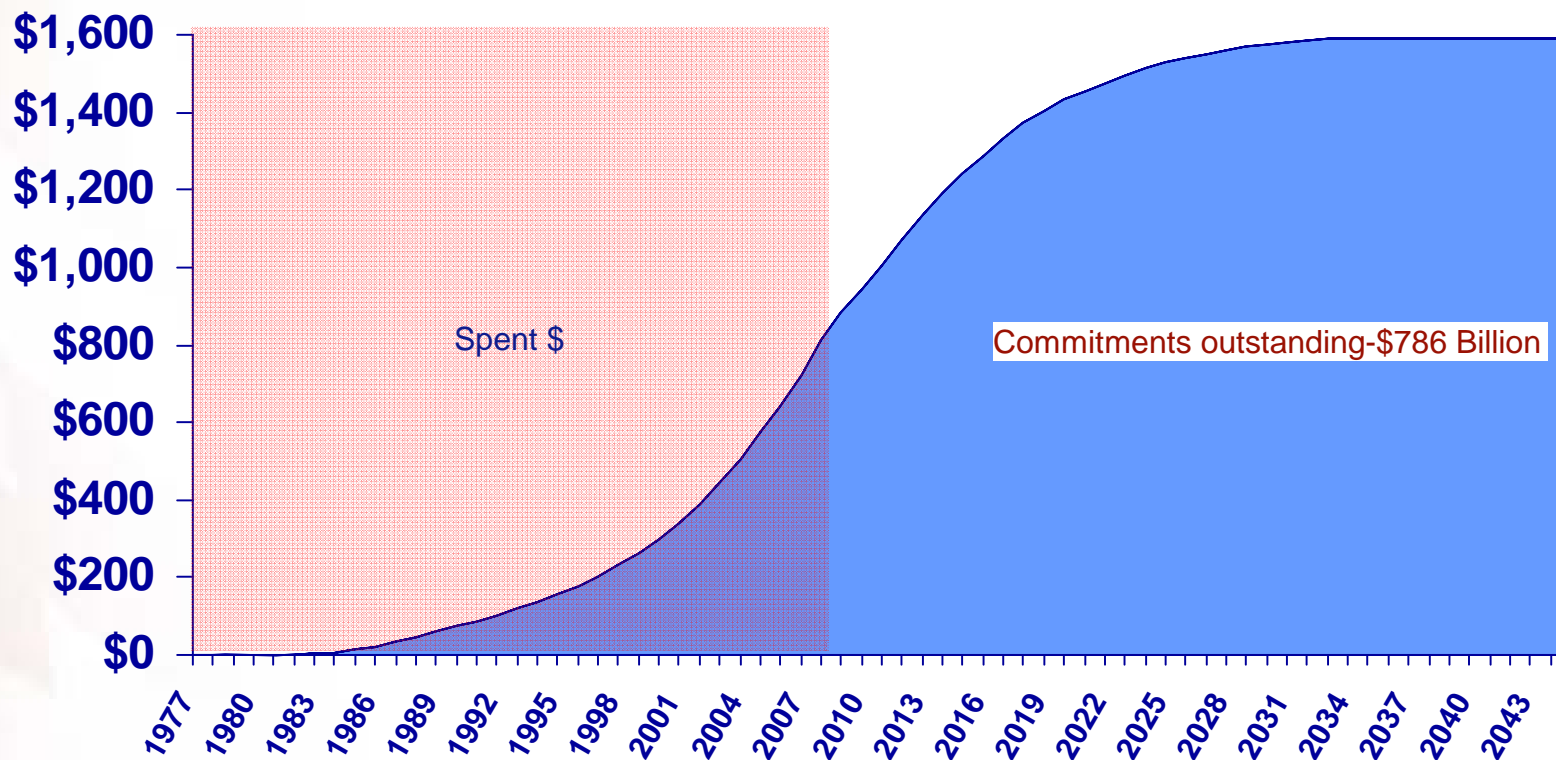**Monterey, CA**
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# Objectives of the Annual Assessment of Major Weapon System Programs

- **Provide a cost/schedule snapshot of DOD's 2008 portfolio** of major weapon system programs and a comparison to portfolios at two other points in time – 1 year ago and 5 years ago

- **Provide observations** about the portfolio's balance, performance of newer programs, and ability to deliver to the warfighter on time

- **Analyze outcomes and knowledge attained at key junctures** in the acquisition process for a subset of the 47 programs primarily still in development

- **Gather data on other factors** that might impact program stability and outcomes such as: cost estimating, requirement setting, software management, and program office staffing

- **Provide an update** on DOD acquisition policy changes

# Snapshot: Committed and Planned Spending on Current Portfolio of 96 Programs

**Billions of FY 2009 dollars**



Spent $

Commitments outstanding-$786 Billion

Y-axis: $0, $200, $400, $600, $800, $1,000, $1,200, $1,400, $1,600

X-axis: 1977, 1980, 1983, 1986, 1989, 1992, 1995, 1998, 2001, 2004, 2007, 2010, 2013, 2016, 2019, 2022, 2025, 2028, 2031, 2034, 2037, 2040, 2043

# Snapshot: Overall Cost and Schedule Growth for the Current Portfolio of 96 Programs

**Performance of DOD's Major Defense Acquisition Program Portfolio**

| Portfolio status | Fiscal year 2003 | Fiscal year 2007 | Fiscal year 2008 |
|---|---|---|---|
| Number of programs | 77 | 95 | 96 |
| Total planned commitments | $1.2 trillion | $1.6 trillion | $1.6 trillion |
| Commitments outstanding | $724 billion | $875 billion | $786 billion |
| Change to total RDT&E costs from first estimate | 37 percent | 40 percent | 42 percent |
| Change in total acquisition cost from first estimate | 19 percent | 26 percent | 25 percent |
| Estimated total acquisition cost growth | $183 billion | $301 billion | $296 billion |
| Share of programs with 25 percent or more increase in program acquisition unit cost | 41 percent | 44 percent | 42 percent |
| Average delay in delivering initial capabilities | 18 months | 21 months | 22 months |

Source: GAO analysis of DOD data.

## Observation: Top 10 Programs Continue to Strain DOD's Buying Power Elsewhere

- 10 of the department's largest programs, commanding about 50% of the acquisition dollars in the portfolio, have experienced significant cost growth and quantity reductions:

  - Development costs have grown by 32%
  - Total program costs have grown by 12%
  - Overall quantities have been reduced by 32%
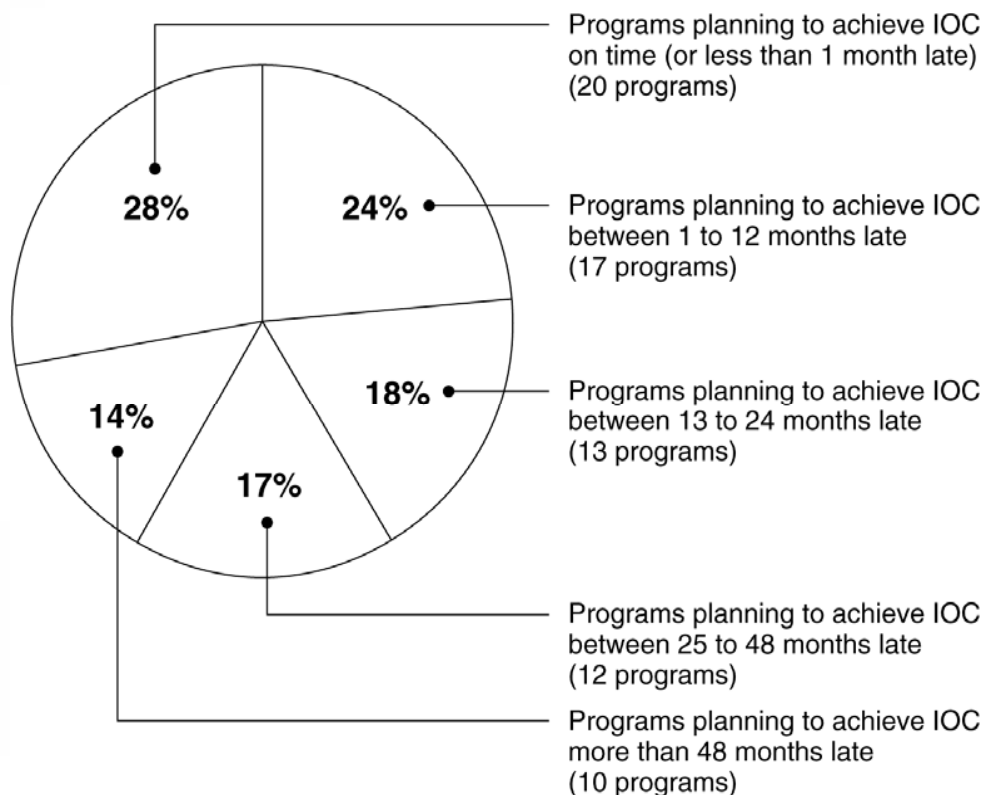  - 7 have acquisition unit costs of greater than 40%

# Observation: Top 10 Programs Continue to Strain DOD's Buying Power Elsewhere

| Program | Total cost (fiscal year 2009 dollars in millions) | | Total quantity | | Acquisition unit cost |
|---|---|---|---|---|---|
| | First full estimate | Current estimate | First full estimate | Current estimate | Percentage change |
| Joint Strike Fighter | 206,410 | 244,772 | 2,866 | 2,456 | 38 |
| Future Combat System | 89,776 | 129,731 | 15 | 15 | 45 |
| Virginia Class Submarine | 58,378 | 81,556 | 30 | 30 | 40 |
| F-22A Raptor | 88,134 | 73,723 | 648 | 184 | 195 |
| C-17 Globemaster III | 51,733 | 73,571 | 210 | 190 | 57 |
| V-22 | 38,726 | 55,544 | 913 | 458 | 186 |
| F/A-18E/F Super Hornet | 78,925 | 51,787 | 1,000 | 493 | 33 |
| Trident II Missile | 49,939 | 49,614 | 845 | 561 | 50 |
| CVN 21 Nuclear Aircraft Class Carrier | 34,360 | 29,914 | 3 | 3 | -13 |
| P-8A Poseidon (MMA) | 29,974 | 29,622 | 115 | 113 | 1 |

Source: GAO analysis of DOD data.

# Observation: Promised Capabilities Continue to Be Delivered Later Than Planned

## Schedule Delays for DOD's 2008 Program Portfolio



Programs planning to achieve IOC on time (or less than 1 month late) (20 programs)

Programs planning to achieve IOC between 1 to 12 months late (17 programs)

Programs planning to achieve IOC between 13 to 24 months late (13 programs)

Programs planning to achieve IOC between 25 to 48 months late (12 programs)

Programs planning to achieve IOC more than 48 months late (10 programs)

28%  24%  14%  17%  18%

# Observation: New Programs Are Performing Better Than Older Programs at This Time

**Changes in Program Cost and Schedule by Age of Program**
**Fiscal Year 2008 Portfolio**

| Age of Program | Change in total RDT&E costs from first estimate | Change in total acquisition cost from first estimate | Average change in quantities | Average number of months late | Number of programs |
|---|---|---|---|---|---|
| 15 or more years since development start | 47 percent | 19 percent | -39 percent | 37 months | 10 |
| 10 to 14 years since development start | 73 percent | 53 percent | 52 percent | 26 months | 17 |
| 5 to 9 years since development start | 37 percent | 31 percent | 9 percent | 22 months | 25 |
| Less than 5 years since development start | 12 percent | 11 percent | 1 percent | 5 months | 28 |

# Caveat: Historically, Largest Percentage of RDT&E Cost Growth Occurs After CDR
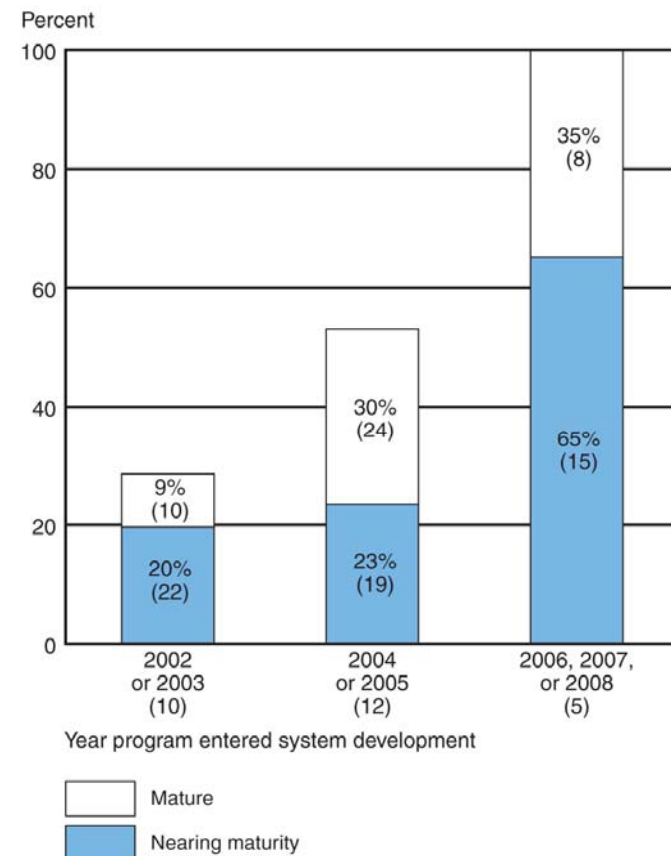
**Percentage of RDT&E cost increase over development estimate**
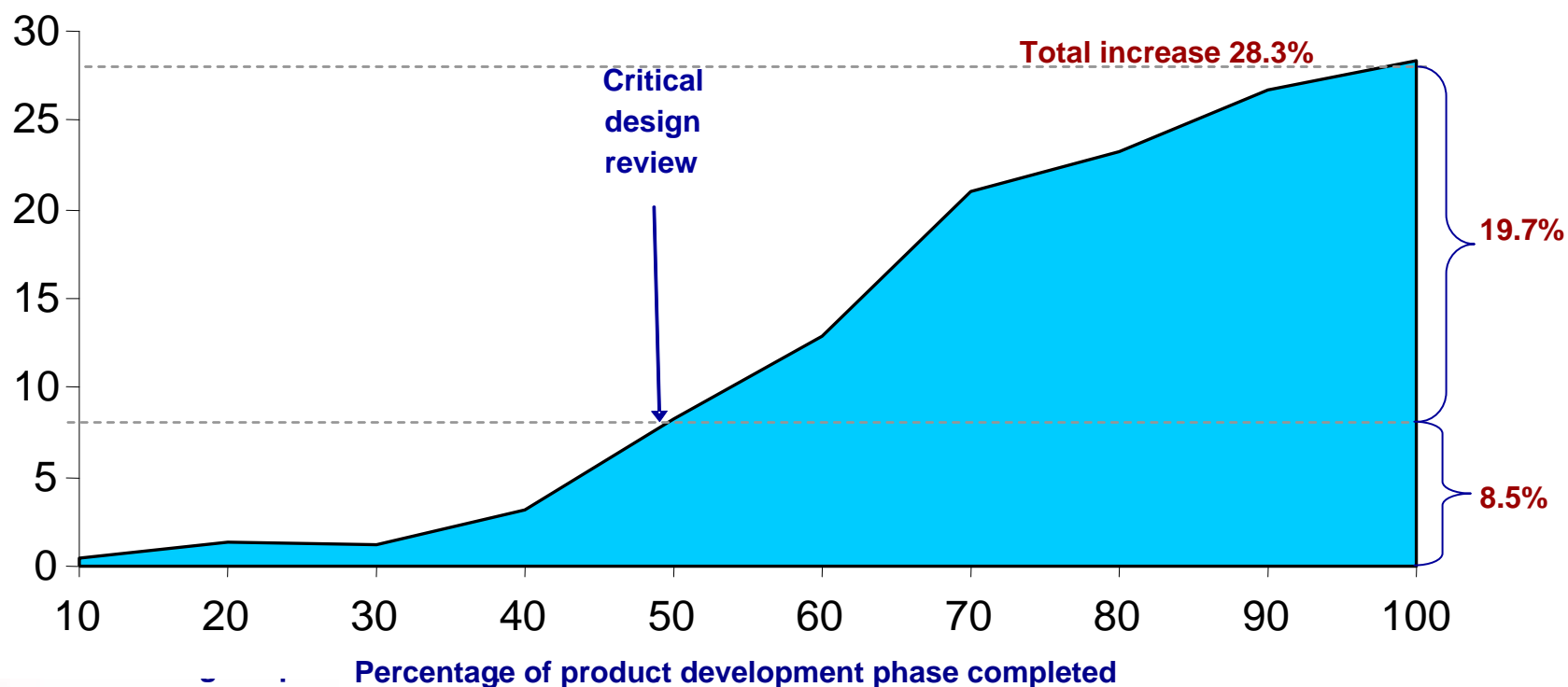


Note: Does not add due to rounding.
Source: GAO-06-391

# Knowledge Analysis: Newer Programs Are Starting with Higher Technology Readiness Levels

- Since 2003, there has been a significant increase in the percentage of critical technologies at least nearing maturity (demonstrated in a relevant environment) prior to development start.

- In the last 3 years, all 5 programs entering system development had their critical technologies demonstrated in at least a relevant environment, in accordance with the DOD and statutory criteria.

Percent

| | 2002 or 2003 (10) | 2004 or 2005 (12) | 2006, 2007, or 2008 (5) |
| Mature | 9% (10) | 30% (24) | 35% (8) |
| Nearing maturity | 20% (22) | 23% (19) | 65% (15) |

Year program entered system development

☐ Mature
■ Nearing maturity

5/14/2009
Source: GAO analysis of DOD data.
Note: Number of programs and technologies in parentheses.
10

# Knowledge Analysis: Programs Report More Design Drawings Complete at CDR

- Since 2003, the average percentage of design drawings releasable for programs at the critical design has steadily increased.

- However, designs, on average, are still far from stable and concurrent technology development increases risk of subsequent design changes and rework.
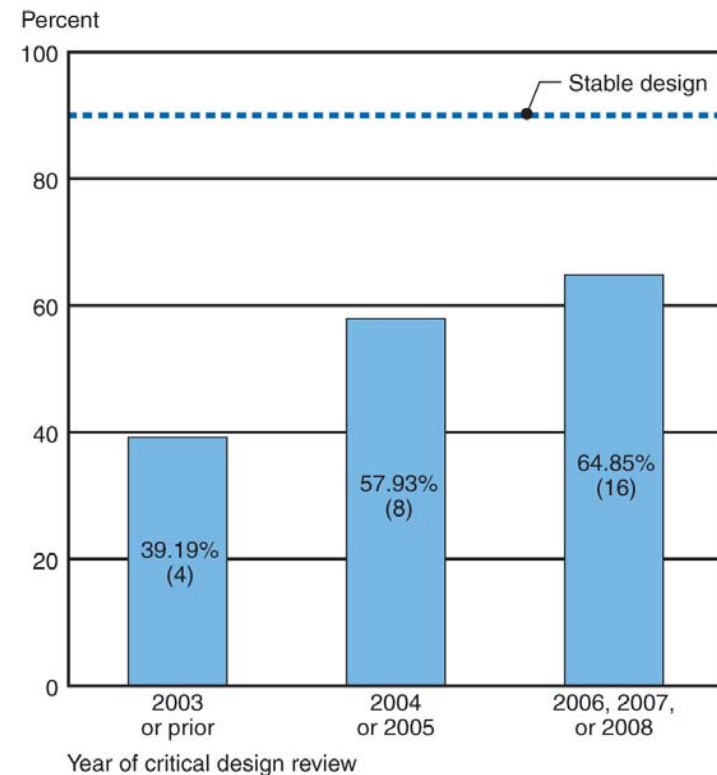
# Knowledge Analysis: Programs Conducting Early Systems Engineering Have Better Outcomes to Date

- Early systems engineering, ideally before a program enters development, is critical to ensuring that requirements can be met with available resources.

- Programs that conducted key systems engineering events prior to development start have experienced lower cost growth on average and often have shorter delays in achieving initial operational capability.

**Average RDT&E Cost Growth by Timing of Key Systems Engineering Reviews**



Percent

Programs that held the review before development start

Programs that held the review after development start
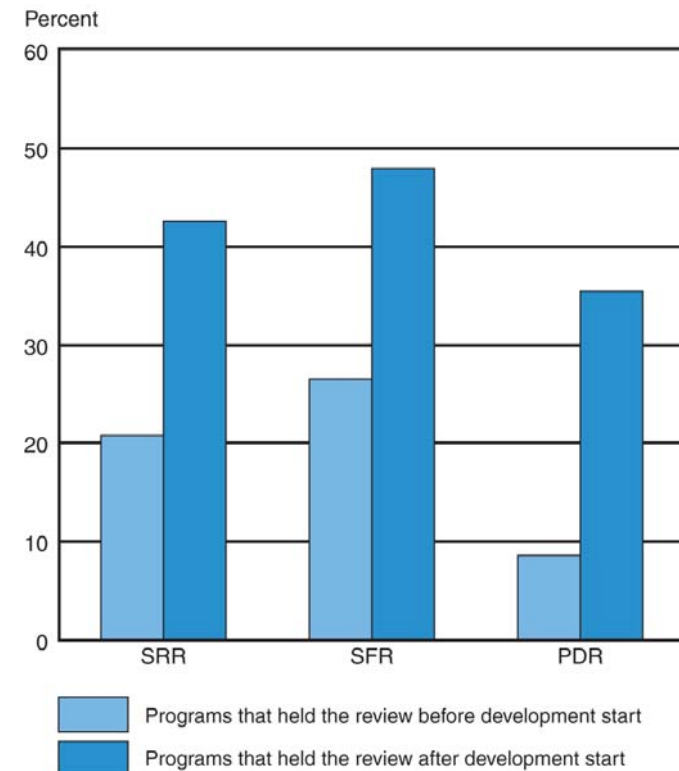
# Data on Other Factors: Requirements, Software Mgmt, Cost Estimating, Staffing

- Programs that changed key system requirements after starting development had cost increases 3x greater than others and schedule delays 2x greater

- Programs with software growth of 25% or more have experienced much more cost and schedule growth then those with lower levels

- Most programs initial cost baselines are based on the program's or service's own estimate and assumptions rather than on an independent estimate done by, for example, the CAIG

- Most programs are not now able to fill all government positions (PM, SE, K, Admin) they have been authorized

## Areas of Relative Agreement Between the DOD and GAO Concerning Problem Sources

- **Acquisition problems have their roots in the requirements and funding processes**
- **Programs are initiated with poor foundations and inadequate knowledge for developing realistic cost estimates**
- **Programs move forward with artificially low cost estimates, optimistic schedules and assumptions, immature technologies and designs, and fluid requirements**
- **Imbalance between needs and the resources available to meet them contributes to budget and program instability**
- **Changing or excessive requirements cause cost growth**

# Recent DOD Acquisition Policy Changes Have the Potential to Significantly Improve Outcomes

**More discipline in the early phases and throughout process will put more knowledge (less risk) upfront in the process**

- Materiel Development Decision required for all programs to level requirements and resources before starting the program
- Configuration Steering Boards established to control requirements creep
- Preference for incremental development, with baselines for each increment
- Preference for holding PDR before system development start
- Competitive prototyping required prior to Milestone B as part of technology development phase
- Growth of Capability Portfolio Managers to elevate programs from stovepipes (reduce gaps/redundant programs)

**Areas of continuing concern**

- Still does not require "time certain" development
- Still allows for concurrent technology and product development and production
- Post-CDR assessment still not a milestone decision
- Controls not in place to ensure accountability and adherence to intent of new policy

## Concluding Remarks

- Acquisition policy initiatives are aimed at the proper target -- the front-end of the process and the systems engineering that is required there

- There is growing consensus that the root causes of poor outcomes lie in misunderstood requirements, unreliable estimates, and unmanageable development times

- The Congress' reform legislation also targets the appropriate troublemakers – lack of systems engineering expertise, lack of accountability and independence among key players

- What's doable on paper is not always doable in reality – the people involved in this enterprise, all of them, must be willing to change the way we develop and deliver weapon systems
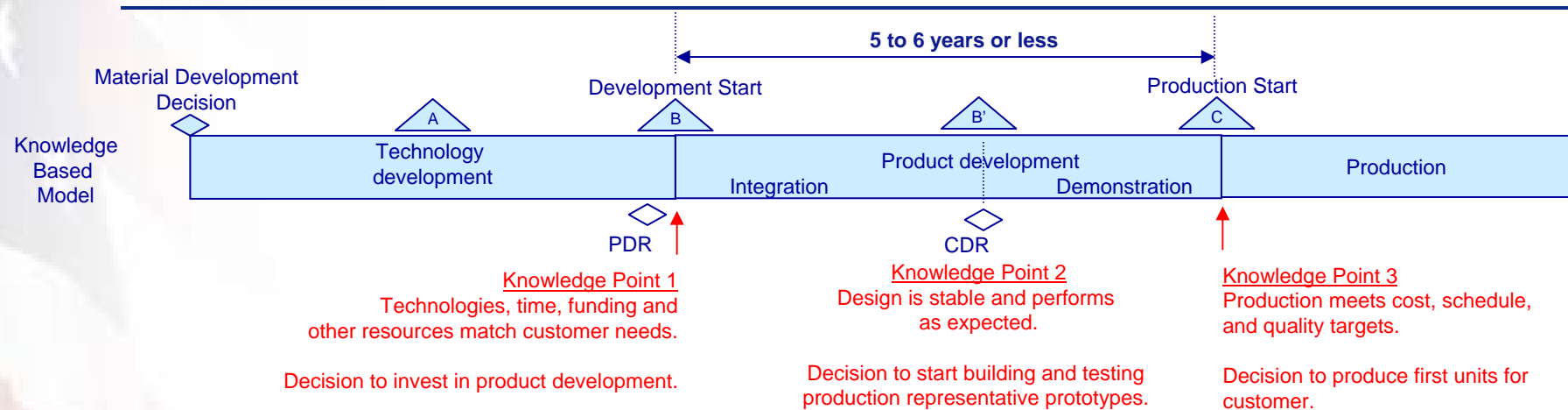
# Thank you!

# Observation: Top 10 Programs Continue to Strain DOD's Buying Power Elsewhere



**10 Largest Major Defense Acquisition Programs ($195B)**

**86 Remaining Programs ($134B)**
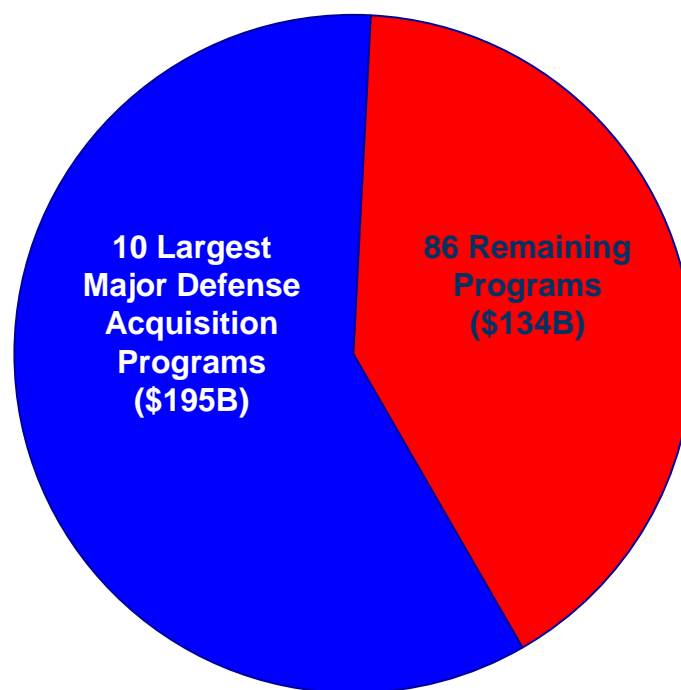
## RDT&E and Procurement Funding 2009-2013 (FY09 Dollars)

Source: GAO analysis of DOD data.

# Knowledge-Based Acquisition Model Focuses on Retiring Risks by Key Decision Points

**5 to 6 years or less**

Material Development Decision

Development Start

Production Start

Knowledge Based Model

A

B

B'

C

Technology development

Product development

Integration

Demonstration

Production

PDR

CDR

**Knowledge Point 1**
Technologies, time, funding and other resources match customer needs.

Decision to invest in product development.

**Knowledge Point 2**
Design is stable and performs as expected.

Decision to start building and testing production representative prototypes.

**Knowledge Point 3**
Production meets cost, schedule, and quality targets.

Decision to produce first units for customer.

- Model provides framework for incremental, time certain (development constrained to 5 to 6 years or less), and knowledge-based approach to weapon system acquisitions.

- Success requires structured, disciplined application and adherence to model.

- Knowledge points align with key investment inflection points.

- Controls are in place for decisions makers to measure progress against specific criteria and ensure managers capture key knowledge before moving to next phase.

# Other Factors: Programs that Changed Key Requirements Experienced Added Instability

- For programs that had at least one requirements change, the average RDT&E cost was more than three times higher and the average schedule delay was twice as long as programs without these changes.
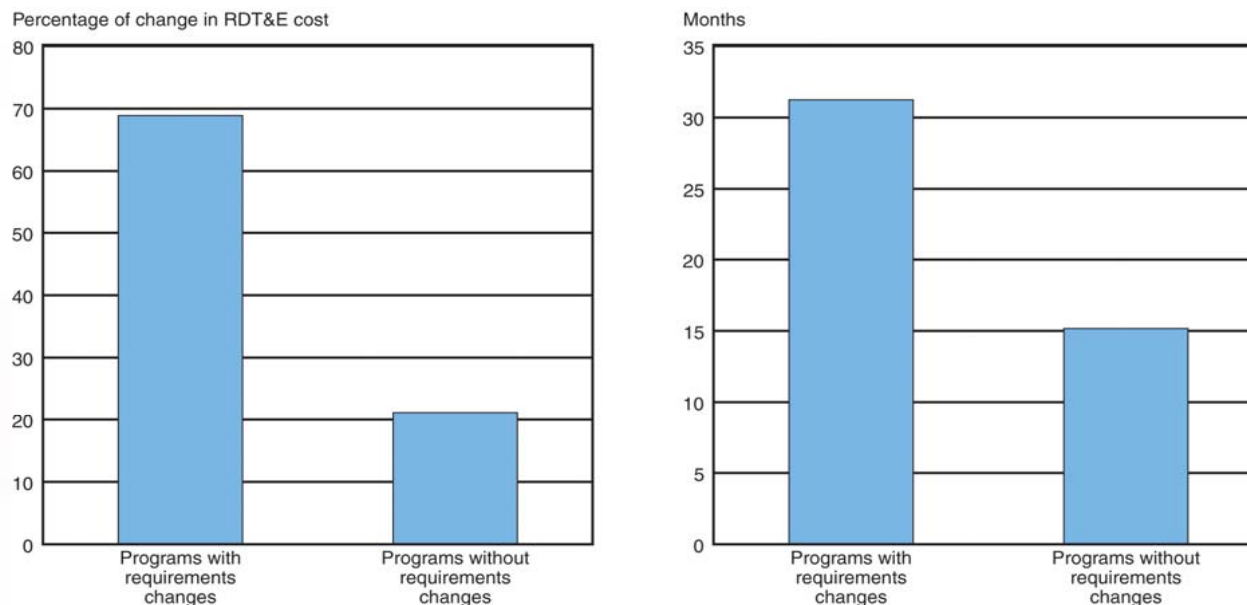
# Big Picture: DOD Investment Remains High, Most Likely Unsustainable

**Fiscal year 2009 dollars in billions**
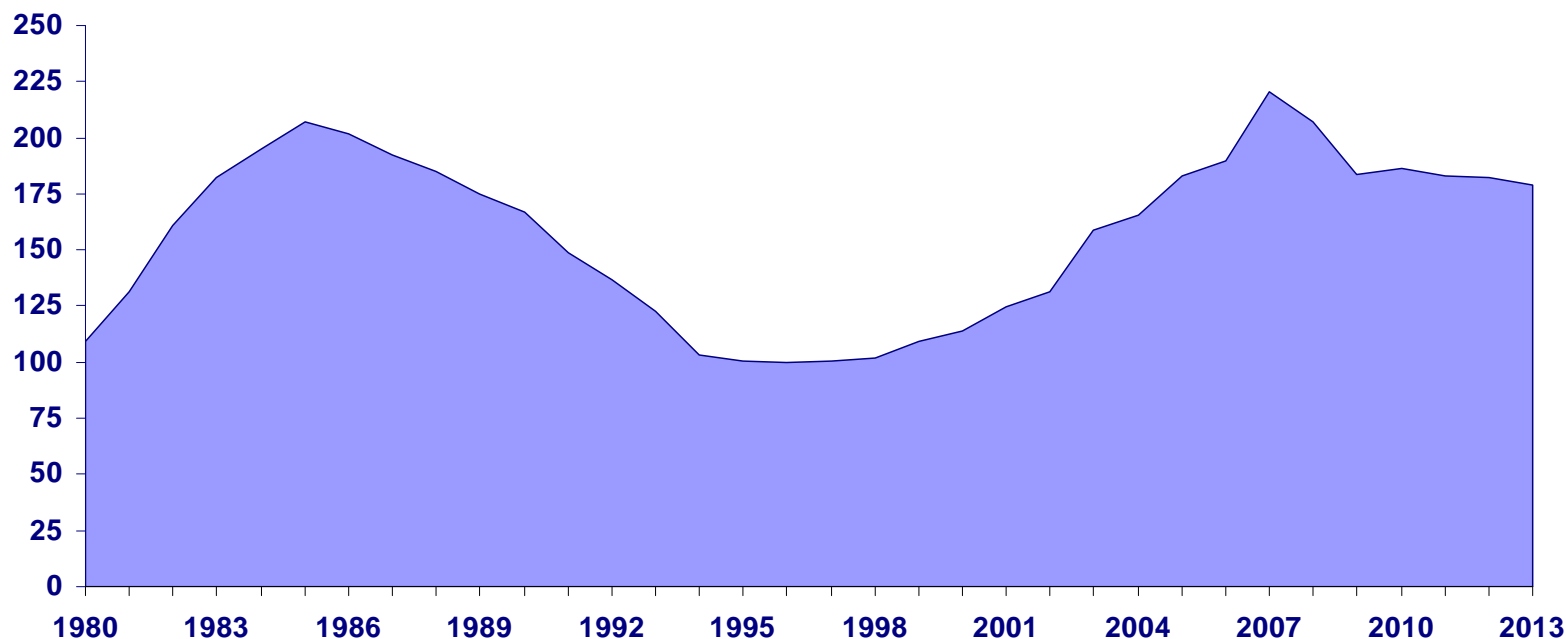


**Research, Development, Test and Evaluation and Procurement Funding**